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**Cal Poly Dairy Products Technology Center, Professors
Receive \$490,000 Grant for Research Using ‘Laser Tweezers’**

SAN LUIS OBISPO – Cal Poly’s Dairy Products Technology Center and professors Rafael Jiménez-Flores and Philip Tong have been awarded a \$490,000 grant from the California State University Agricultural Research Initiative for a study involving “laser tweezer” equipment.

Their three-year project will use laser tweezers, also known as optical tweezers. Scientists will use the equipment to measure properties of the components of milk fat globules (MFGs) and their membranes (MFGMs), which are abundant in milk, buttermilk, cream and whey. The state grant matches a \$490,000 grant from Dairy Management Inc. for an ongoing study and promotion of dairy ingredients at Cal Poly’s DPTC.

Laser tweezers use a strongly focused laser beam to trap small particles and objects within the beam. The laser tweezers can then manipulate individual cells and similarly sized bits of matter, Jiménez explained, and measure the forces involved with great precision. Measuring the interactions of the particles accurately is important to assess their function, he added.

MFGs and MFGMs are important yet unexplored component of milk, Tong said. They contain proteins, lipids, oligosaccharides, phospholipids, glycolipids, glycoproteins and other compounds with proven biological activity, Tong explained.

“These components of the MFGM are very important for both human health and as ingredients in other foods. But there has been little work on done generating data on their physical properties or characterization of their function,” Jiménez added.

Professors Jiménez and Tong hope to generate better understanding and utilization of MFG and MFGM. “We hope that this project results in important data that directly measures how membranes and their components work naturally in our foods, and how this is relevant to our health,” said Jiménez.

The research findings will also have practical implications for the dairy food industry, Tong stressed. “This work will help to highlight the functional and nutritional properties of milk fat globule membranes, which should be attractive to food formulators and processors,” said Tong.

Professor John Sharpe of the Cal Poly Physics Department's Dynamical Systems Imaging Laboratory will join Jiménez and Tong on the research project. Sharpe has experience working with the laser tweezer equipment. He is currently building the infrastructure and systems required to set up the equipment and research module.

UC Davis Professor Juan Fernando Medrano will contribute bovine mammary cells for the project. “The mammary cells are the biological generators of the MFGM, and we need to study

them, also, to gain the fundamental understanding of the biological activity of the membrane components,” Jiménez explained.

As part of the study, scientists at the DPTC will be generating processes for the concentration and production of ingredients containing MFGM components and characterizing their properties by traditional procedures.

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For more information on this work on other work taking place at the DPTC, visit its website: www.calpoly.edu/~dptc or call DPTC research associate Laurie Jacobson at (805) 756-6097.